1. Install Visual Studio 2015
2. Set LDROOT=…\engauge\_digitizer\dev\windows\library\_dependencies
3. Download and install nasm=-2.14rc0-installer-x64.exe
   1. Add directory containing nasm.exe to PATH
4. Install the yasm assembler into Visual Studio 2015 according to steps at <https://www.tortall.net/projects/yasm/manual/html/vsyasm.html>
5. Extract the following into %LDROOT% (with version numbers recommended by <http://www.linuxfromscratch.org/blfs/view/cvs/general/poppler.html>):
   1. Cmake-3.8.0-win64-x64.msi (creates solution files for visual studio)
   2. Fontconfig-master.zip (from github/ShiftMediaProject/fontconfig which has a Windows solution file. For poppler)
   3. Freetype-2.9.tar.gz (for fontconfig)
   4. Libiconv-win-build.zip (from github/kiyolee/libconv-win-build. Optional for fontconfig)
   5. Libjpeg-turbo-1.5.3.tar.gz (for poppler)
   6. Libpng-1.6.34.tar.gz (for poppler)
   7. Libxml2-2.9.4.tar.gz (for fontconfig)
   8. Openjpeg-2.3.0.tar.gz (for poppler)
   9. Poppler-0.62.0.tar.xz
   10. Zlib-1.2.8.tar.gz (for libpng)
6. For cmake
   1. Run the cmake-3.8.0-win64-x64.msi
   2. Put cmake.exe into PATH in Control Panel / System / Advanced Settings / Environment Variables
7. For openjpeg,
   1. start Qt 64 bit window for VS 2015
   2. Cd %LDROOT%/openjpeg-0.62.0
   3. Mkdir build
   4. Cd build
   5. Cmake ..
   6. Start “Visual Studio 2015”
   7. File / Open / Project Solution
   8. %LDROOT%/openjpeg-0.62.0/build/ALL-BUILD.sln
   9. Change dropdown at top from Debug to Release
   10. Select “Solution OPENJPEG” in Solution Explorer window
   11. Build / Build Solution (creates files in openjpeg-0.62.0/build/bin/Release)
8. For zlib
   1. start Qt 64 bit window for VS 2015
   2. Cd %LDROOT%/zlib-1.2.8
   3. Mkdir build
   4. Cd build
   5. Cmake ..
   6. Start “Visual Studio 2015”
   7. File / Open / Project Solution
   8. Change dropdown at top from Debug to Release
   9. %LDROOT%/openjpeg-0.62.0/build/ALL-BUILD.sln
   10. Select zlib in Solution Explorer window
   11. Build / Build Solution (creates files in zlib-1.2.8/build/Release)
9. For libpng
   1. Start “Visual Studio 2015”
   2. File / Open / Project Solution
   3. %LDROOT%/libpng-1.6.34/projects/vstudio/vstudio.sln
   4. Change dropdown at top from Debug to Release
   5. Build zlib:
      1. Select “zlib” in Solution Explorer
      2. Right click on “zlib” and select “Properties”
      3. Select “VC++ Directories”
      4. Select “Include Directories”
      5. Select “arrow down” button to the right of “Include Directories”
      6. Select “<Edit>”
      7. Select “New Line” button which looks like a yellow folder with a yellow asterisk on it
      8. Select “…” to select a directory
      9. Select “%LDROOT%/zlib-1.2.8/build”
      10. Select “Select Folder” button
      11. Select “Ok” button
      12. Select “Ok” button
      13. Right click on “zlib” in Solution Explorer and pick “Build”. This builds zlib.lib
   6. Build libpng:
      1. Select “libpng” in Solution Explorer
      2. Right click on “libpng” and select “Properties”
      3. Select “VC++ Directories”
      4. Select “Include Directories”
      5. Select “arrow down” button to the right of “Include Directories”
      6. Select “<Edit>”
      7. Select “New Line” button which looks like a yellow folder with a yellow asterisk on it
      8. Select “…” to select a directory
      9. Select “%LDROOT%/zlib-1.2.8/build”
      10. Select “Select Folder” button
      11. Select “Ok” button
      12. Select “Ok” button
      13. Right click on “libpng” in Solution Explorer and pick “Build”. This builds libpng16.dll
10. For libjpeg-turbo
    1. start Qt 64 bit window for VS 2015
    2. Cd %LDROOT%/libjpeg-turbo-1.5.3
    3. Edit simd/CMakeLists.txt
       1. Comment out the ‘if (NOT DEFINED NASM)’ line and its corresponding ‘endif()’ line, then save the file. This is required since coming into this script NASM=NASM-NOTFOUND so find\_program never searches for NASM)
    4. Mkdir build
    5. Cd build
    6. (Before continuing, make sure NASM is installed and NASM.exe is on the PATH, so CMake knows how to build jsimdcpu.asm)
    7. CMake .. (if you see the line NASM=NASM-NOTFOUND then NASM was not properly installed or the simd/CMakeLists.txt file was not correctly edited). Note that simd/CMakeLists.txt is doing the search for nasm, then yasm)
    8. Start “Visual Studio 2015”
    9. File / Open / Project Solution
    10. %LDROOT%/libjpeg-turbo-1.5.3/build/libjpeg-turbo.sln
    11. Change dropdown at top from Debug to Release
    12. Right click on ALL\_BUILD/simd/CMakeRules/jsimdcpu.obj.rule in Solution Explorer window
    13. Select Properties
    14. Select General
    15. Edit co
    16. Select “Solution ‘ALL\_BUILD” in Solution Explorer window
    17. Build / Build Solution (creates files in libjpeg-turbo-1.5.3/build/Release and libjpeg-turbo-1.5.3/build/sharedlib/Release)
11. For freetype
    1. Start “Visual Studio 2015”
    2. File / Open / ProjectSolution
    3. Freetype-2.9 / builds / win32 / vc2010
    4. Change dropdown at top from Debug to Release
    5. Right click on freetype in Solution Explorer window
    6. Properties
    7. Make sure Configuration dropdown at top says Release
    8. Build (creates freetype-2.9 / objs /win32 / vc2010 / Release / freetype.lib and freetype.dll)
    9. Cd objs / win32 / vc2010 / Release
    10. Copy freetype.lib libfreetype.lib (expected by fontconfig)
12. For libiconv-win-build
    1. Start “Visual Studio 2015”
    2. File / Open / ProjectSolution
    3. Libiconv-win-build-master / build-VS2015 / libiconv.sln
    4. Change dropdown at top from Debug to Release
    5. Select dll / libiconv in Solution Explorer window and select BUILD (builds build-VS2015 / Release / libiconv.dll)
    6. Select static / libiconv-static in Solution Explorer window and select Build (builds build-VS2015 / Release / libiconv.lib
    7. Cd build-VS2015 / Release
    8. Copy libiconv.lib iconv.lib (filename expected by libxml2)
13. For libxml2 we use nmake, since the Visual Studio project file is broken. Following http://marlowa.blogspot.com/2013/07/how-to-build-libxml2-on-windows-using.html
    1. start Qt 64 bit window for VS 2015
    2. set PATH=”C:\Program Files (x86)\Microsoft Visual Studio 14.0\VC”:%PATH%
    3. set PATH=”C:\Program Files (x86)\Microsoft Visual Studio 14.0\VC\bin”:%PATH%
    4. set PATH=”…\library-dependencies\libiconv-win-build-master\build-VS2015\Debug”:%PATH%
    5. cd win32
    6. cscript configure.js compiler=msvc include=”…\library-dependencies\libiconv-win-build-master\include” lib=”…\library-dependencies\libiconv-win-build-master\build-vs2015\debug” debug=no (this creates file config.msvc)
    7. edit file Makefile.msvc
    8. After line ‘CFLAGS=$(CFLAGS) /D\_CRT\_SECURE\_NO\_DEPRECATE /D\_CRT\_NONSTDC\_NO\_DEPRECATED”, add the line “CFLAGS=$(CFLAGS) /D\_SECURE\_SCL=0 /D\_SCL\_SECURE\_NO\_WARNINGS /D\_SCL\_SECURE\_NO\_DEPRECATE
    9. Save file and exit editor
    10. Vcvarsall.bat
    11. Nmake (this creates win32/bin.msvc/libxml2.dll and libxml2.lib)
14. For fontconfig (using ShiftMediaSolution release with its support for Windows)
    1. Start “Visual Studio 2015”
    2. File / Open / ProjectSolution
    3. Fontconfig-master / SMP / libfontconfig.sln
    4. Change dropdown at top from Debug to Release
    5. Right click on libfontconfig in Solution Explorer window
    6. Properties
    7. Make sure Configuration dropdown at top says Release
    8. General
       1. Output Directory
       2. change from $(ProjectDir)..\..\..\msvc\ to $(ProjectDir)\msvsc\
    9. C/C++
       1. Additional Include Directories
       2. add path to %LDROOT%/freetype-2.9/include
       3. add path to %LDROOT%/libiconv-win-build-master/include
       4. add path to %LDROOT%/libxml2-2.9.7/include
       5. Right click on libconfig in Solution Explorer window
    10. VC++ Directories
        1. Library Directories
        2. add %LDROOT%/libiconv-win-build-master/build-VS2015/Release
        3. add %LDROOT%/freetype-2.9/objs/Win32/Release
        4. add %LDROOT%/libxml2-2.9.7/win32/bin.msvc
    11. Build (creates SMP/msvc/lib/x64/libfontconfig.lib)
15. For poppler
    1. start Qt 64 bit window for VS 2015
    2. Cd %LDROOT%/poppler-0.62.0
    3. Mkdir build
    4. Cd build
    5. Set FREETYPE\_INCLUDE\_DIRS=%LDROOT%\freetype-2.9\include; %LDROOT%\freetype-2.9\include\freetype
    6. Set FREETYPE\_LIBRARY=%LDROOT%\freetype-2.9\objs\Win32\Release\freetype.lib
    7. Set ICONV\_LIBRARY=%LDROOT%\libiconv-win-build-master\build-VS2015\Release\libiconv.lib
    8. Set JPEG\_INCLUDE\_DIR=%LDROOT%\libjpeg-turbo-1.5.3
    9. Set JPEG\_LIBRARY=%LDROOT%\libjpeg-turbo-1.5.3\build\Release\jpeg-static.lib
    10. Set LIBOPENJPEG2\_INCLUDE\_DIR=%LDROOT%\openjpeg-2.3.0\src\lib\openjp2
    11. Set LIBOPENJPEG2\_LIBRARY=%LDROOT%\openjpeg-2.3.0\build\bin\Release\openjp2.lib
    12. Set PNG\_INCLUDE\_DIR=%LDROOT%\libpng-1.6.34
    13. Set PNG\_LIBRARY=%LDROOT%\projects\vstudio\Release\libpng16.lib
    14. Set ZLIB\_INCLUDE\_DIR=%LDROOT%
    15. Set ZLIB\_LIBRARY=%LDROOT%\zlib-1.2.8\build\Release\zlib.lib
    16. Cmake .. -DFREETYPE\_INCLUDE\_DIRS=%FREETYPE\_INCLUDE\_DIRS% -DFREETYPE\_LIBRARY=%FREETYPE\_LIBRARY% -DICONV\_LIBRARIES=%ICONV\_LIBRARY% -DJPEG\_INCLUDE\_DIR=%JPEG\_INCLUDE\_DIR% -DJPEG\_LIBRARY=%JPEG\_LIBRARY% -DLIBOPENJPEG2\_INCLUDE\_DIRS=%LIBOPENJPEG2\_INCLUDE\_DIR% -DLIBOPENJPEG2\_LIBRARIES=%LIBOPENJPEG2\_LIBRARY% -DPNG\_PNG\_INCLUDE\_DIR=%PNG\_INCLUDE\_DIR% -DPNG\_LIBRARY=%PNG\_LIBRARY% -DZLIB\_INCLUDE\_DIR=%ZLIB\_INCLUDE\_DIR% -DZLIB\_LIBRARY=%ZLIB\_LIBRARY% (note the weird spellings in large red letters)
    17. Start “Visual Studio 2015”
    18. File / Open / ProjectSolution
    19. Poppler-0.62.0\build\poppler.sln
    20. Change dropdown at top from Debug to Release
    21. Right click on poppler in Solution Explorer window
        1. Properties
        2. Select “VC++ Directories”
        3. Select “Include Directories”
        4. Select “arrow down” button to the right of “Include Directories”
        5. Select “<Edit>”
        6. Add “%LDROOT%\freetype-2.9\include”
        7. Add “%LDROOT%\libjpeg-turbo-1.5.3\build”
        8. Add “%LDROOT%\openjpeg-2.3.0\build\src\lib\openjp2”
        9. Add “%LDROOT%\zlib-1.2.8\build”
    22. Right click on poppler in Solution Explorer window
        1. Build (this creates build\Release\poppler.lib